

*IPW*

PTO/SB/21 (09-06)

Approved for use through 03/31/2007. OMB 0651-0031

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

## TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Total Number of Pages in This Submission

12

Application Number

10/758,152

Filing Date

January 15, 2004

First Named Inventor

Jeremy Wickins

Art Unit

1723

Examiner Name

Terry K. Cecil

Attorney Docket Number

1003-0059

### ENCLOSURES (Check all that apply)

- |                                                                            |                                                                                         |                                                                                         |
|----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| <input type="checkbox"/> Fee Transmittal Form                              | <input type="checkbox"/> Drawing(s)                                                     | <input type="checkbox"/> After Allowance Communication to TC                            |
| <input type="checkbox"/> Fee Attached                                      | <input type="checkbox"/> Licensing-related Papers                                       | <input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences     |
| <input type="checkbox"/> Amendment/Reply                                   | <input type="checkbox"/> Petition                                                       | <input type="checkbox"/> Appeal Communication to TC (Appeal Notice, Brief, Reply Brief) |
| <input type="checkbox"/> After Final                                       | <input type="checkbox"/> Petition to Convert to a Provisional Application               | <input type="checkbox"/> Proprietary Information                                        |
| <input type="checkbox"/> Affidavits/declaration(s)                         | <input type="checkbox"/> Power of Attorney, Revocation Change of Correspondence Address | <input type="checkbox"/> Status Letter                                                  |
| <input type="checkbox"/> Extension of Time Request                         | <input type="checkbox"/> Terminal Disclaimer                                            | <input checked="" type="checkbox"/> Other Enclosure(s) (please identify below):         |
| <input type="checkbox"/> Express Abandonment Request                       | <input type="checkbox"/> Request for Refund                                             | - Priority Document                                                                     |
| <input type="checkbox"/> Information Disclosure Statement                  | <input type="checkbox"/> CD, Number of CD(s) _____                                      | - Return Receipt Postcard                                                               |
| <input checked="" type="checkbox"/> Certified Copy of Priority Document(s) | <input type="checkbox"/> Landscape Table on CD                                          |                                                                                         |
| <input type="checkbox"/> Reply to Missing Parts/Incomplete Application     |                                                                                         |                                                                                         |
| <input type="checkbox"/> Reply to Missing Parts under 37 CFR 1.52 or 1.53  |                                                                                         |                                                                                         |

Remarks

### SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name

Cook, Alex, McFarron, Manzo, Cummings & Mehler, Ltd.

Signature

*Edward M. Keating*

Printed name

Edward M. Keating

Date

December 4, 2006

Reg. No.

20,646

### CERTIFICATE OF TRANSMISSION/MAILING

I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below:

Signature

*Susan Shick*

Typed or printed name

Susan Shick

Date

December 4, 2006

This collection of information is required by 37 CFR 1.5. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

American LegalNet, Inc.  
www.FormsWorkflow.com



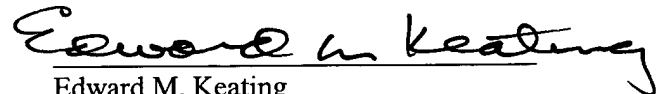
Bromhead 1003-0059  
PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Jeremy Wickins	]	
Serial No.:	10/758,152	]	Examiner: Terry K. Cecil
Filed:	January 15, 2004	]	Art Unit 1723
For:	WASTEWATER TREATMENT APPARATUS	]	Confirmation No. 4633

**Certificate of Mailing**

I hereby certify that this correspondence is being deposited with the United States Postal Service as first-class mail in an envelope addressed to: Commissioner for Patents, Washington, DC on December 4, 2006.

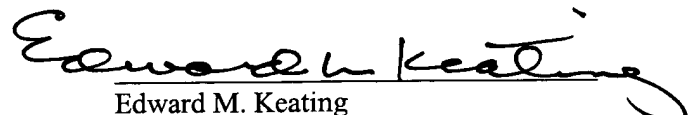
  
Edward M. Keating  
Registration No. 20,646

Commissioner for Patents  
P. O. Box 1450  
Alexandria, VA 22313-1450

**PRIORITY DOCUMENT**

Enclosed is a certified copy of British Patent Application No. 0301092.3, filed on 17 January 2003, which is being filed in support of Applicant's claim for priority under 35 U.S.C. §119(a)(d) or (f).

Respectfully submitted,

  
Edward M. Keating  
Registration No. 20,646

COOK, ALEX, McFARRON, MANZO  
CUMMINGS & MEHLER, LTD.  
200 W. Adams St., Suite 2850  
Chicago, IL 60606  
(312) 236-8500



INVESTOR IN PEOPLE

The Patent Office  
Concept House  
Cardiff Road  
Newport  
South Wales  
NP10 8QQ

I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation & Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein.

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1980 with the same name as that with which it was registered immediately before re-registration save for the substitution as, or inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

In accordance with the rules, the words "public limited company" may be replaced by p.l.c., P.L.C. or PLC.

Registration under the Companies Act does not constitute a new legal entity but merely subjects the company to certain additional company law rules.

Signed

*Andrew Gasey*

Dated 19 January 2004

**CERTIFIED COPY OF  
PRIORITY DOCUMENT**

## Patent Form 1/77

Patents Act 1977  
(Rule 16)

The  
Patent  
Office

17JAN03 1777971-1 D02808  
P01/7700 0.00-0301092.3

## Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

THE PATENT OFFICE

17 JAN 2003

RECEIVED BY FAX

The Patent Office

Cardiff Road  
Newport  
Gwent NP9 1RH

## 1. Your reference

DJC/AM-Wickins

## 2. Patent application number

(The Patent Office will fill in this part)

0301092.3

17 JAN 2003

3. Full name, address and postcode of the or of each applicant (underline all surnames)

Jeremy Wickins,  
Blackstone Cottage,  
41 Leylands Road,  
Burgess Hill,  
Sussex RH15 8AF

Patents ADP number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

6061 493001

## 4. Title of the invention

Wastewater treatment apparatus

## 5. Name of your agent (if you have one)

Bromhead &amp; Co.,

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

37 Great James Street,  
London WC1N 3HB

Patents ADP number (if you know it)

455039

## 6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number

Country

Priority application number  
(if you know it)

Date of filing  
(day / month / year)

## 7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing  
(day / month / year)

## 8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:

No

- a) any applicant named in part 3 is not an inventor, or
- b) there is an inventor who is not named as an applicant, or
- c) any named applicant is a corporate body.

See now (d)).

**Patents Form 1/77**

9. Enter the number of sheets for any of the following items you are filing with this form. Do not count copies of the same document

Continuation sheets of this form

Description 2 x 7

Claim(s)

Abstract

Drawing(s) 2 x 1 

10. If you are also filing any of the following, state how many against each item.

Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (Patents Form 7/77)

Request for preliminary examination and search (Patents Form 2/77)

Request for substantive examination (Patents Form 10/77)

Any other documents (please specify)

11.

I/We request the grant of a patent on the basis of this application.

Signature Bromhead & Co. Date 17/01/03

12. Name and daytime telephone number of person to contact in the United Kingdom

David J. Crouch  
0207 405 7010**Warning**

After an application for a patent has been filed, the Comptroller of the Patent Office will consider whether publication or communication of the invention should be prohibited or restricted under Section 22 of the Patents Act 1977. You will be informed if it is necessary to prohibit or restrict your invention in this way. Furthermore, if you live in the United Kingdom, Section 23 of the Patents Act 1977 stops you from applying for a patent abroad without first getting written permission from the Patent Office unless an application has been filed at least 6 weeks beforehand in the United Kingdom for a patent for the same invention and either no direction prohibiting publication or communication has been given, or any such direction has been revoked.

**Notes**

- If you need help to fill in this form or you have any questions, please contact the Patent Office on 0645 500505.
- Write your answers in capital letters using black ink or you may type them.
- If there is not enough space for all the relevant details on any part of this form, please continue on a separate sheet of paper and write "see continuation sheet" in the relevant part(s). Any continuation sheet should be attached to this form.
- If you have answered 'Yes' Patents Form 7/77 will need to be filed.
- Once you have filled in the form you must remember to sign and date it.
- For details of the fee and ways to pay please contact the Patent Office.

-1-

**Wastewater treatment apparatus**

The present invention relates to wastewater treatment apparatus comprising at least one pre-tank and a reactor tank between which a transfer connection is provided to enable wastewater to be transferred from the or each pre-tank to the reactor tank, and in which the reactor tank is provided with a biomass and aeration equipment to enable the wastewater to be treated in the reactor tank.

It is established practice in the water industry to determine the capacity of the apparatus for dealing with storm conditions in terms of the flow the apparatus has to deal with in dry weather. Thus, to deal with storm conditions, the apparatus is further provided with storm tanks, and overflows or weirs are provided to feed excess flow to these storm tanks. Normally, at least two storm tanks are provided, with the second storm tank beginning to fill after the first has been filled. This increases the likelihood that solids will settle in these storm tanks. However, in the event that the storm tanks cannot cope with the storm conditions, ultimately water overflows from the second storm tank through a screen and into a river or stream. Typically, the storm tanks are required to be capable of containing the amount of wastewater that flows at, say, three times the dry weather flow for a period of at least two hours.

After the storm subsides, the contents of the storm tanks are passed back to the apparatus for treatment,

-2-

with scraping equipment in the storm tanks to scrape solids settled off the bottom, also to be returned to the treatment apparatus. This also requires odour control in addition to duty stand-by of all the pumps and equipment.

- 5        The provision of storm tanks, scraping equipment and odour control all increase the cost of the apparatus.

The present invention seeks to provide a remedy.

- Accordingly, the present invention is directed to wastewater treatment apparatus having the construction
- 10    set out in the opening paragraph of the present specification, **characterised in that** the capacity of the pre-tank or pre-tanks enables it or them to retain the storm flow for a sufficient period of time and **in that** the or one of the pre-tanks is provided with a storm
- 15    overflow, whereby even in storm conditions the reactor tank remains effective and settled solids from the storm flow in the pre-tank or one of the pre-tanks are transferred at intervals to the reactor tank, and in the event of persistence of the storm conditions, excess
- 20    wastewater is released via the storm overflow without interrupting operation of the reactor tank.

- Preferably, the or each pre-tank is provided with a stirrer. This provides the means to maintain a degree of homogeneity of the wastewater in non-storm conditions.
- 25    Instead of or in addition to the stirrer there may be provided aeration equipment in the or each pre-tank.

At least one of the pre-tanks may be provided with a level sensor to switch-off such a stirrer and/or aeration

-3-

equipment once the level of the wastewater in that tank rises above a predetermined level.

This increases the likelihood that solids will settle in the or each pre-tank in storm conditions. The position at which the transfer connection opens into the or each pre-tank may be provided with a cover to reduce the turbulence of fluid within that tank, so that it is not unduly unsettled in storm conditions, when transfer takes place.

10 The or each cover may comprise a plate.

The storm overflow may comprise a weir as a simple means of dealing with excess wastewater.

There may be two pre-tanks connected together via the transfer connection. Preferably, with two such tanks, they are provided with respective inlets, each with its own shut-off valve, as well as two outlets to the transfer connection also with respective shut-off valves. This enables one tank to be isolated from the rest of the apparatus and serviced whilst the other pre-tank remains in operation, which in turn enables the apparatus to be serviced without being shut down. In the event of storm conditions, the inlet to one of the pre-tanks may then be closed so that the flow is directed into only one of the pre-tanks for initial settlement.

25 Once that tank cannot accommodate further flow, both shut-off valves of the outlets can be opened to enable fluid to flow into the other of the pre-tanks before, ultimately, excess flow flows out through the storm

-4-

overflow.

The present invention extends to a method of treating wastewater comprising feeding wastewater to at least one pre-tank from which it is fed at intervals to a reactor tank containing a biomass and aeration equipment to treat the wastewater **characterised in that** the pre-tank or pre-tanks have a capacity to enable it or them to retain storm flow for a sufficient period of time whilst the reactor tank remains effective and settled solids in one of the pre-tanks are transferred at intervals to the reactor tank and **in that** in the event of persistence of storm conditions, excess wastewater is released via a storm overflow provided in the or one of the pre-tanks without interrupting operation of the reactor tank.

An example of wastewater treatment apparatus embodying the present invention will now be described with reference to the accompanying drawing, the only figure of which shows the apparatus in diagrammatic plan form.

The apparatus shown in the only figure of the drawings comprises two pre-tanks 10 and 12 provided with respective inlets 14 and 16 connected to a common feed line 18 via respective shut-off valves 20 and 22. At the base of each pre-tank 10 and 12 there is a sump 24 and 26 respectively leading to respective outlets 28 and 30. The sump and the outlets are covered by respective cover plates 32 and 34 with a relatively small spacing between the plates and the base of the reactor tanks 10 and 12.

-5-

The outlets 28 and 30 are in turn reconnected to a common transfer line 38 to a reactor tank 40 via respective shut-off valves 42 and 44.

The base of each pre-tank 10 and 12 is provided with  
5 an aerator 46 and 48, respectively, and also a mechanical stirrer 50 and 52, respectively. The stirrers are provided with respective motors 49 and 51. Pumps 53 and 55 are also provided for each aerator 46 and 48 to pump air therethrough and pumps 57 and 59 are also provided to  
10 pump wastewater from each pre-tank 10 and 12 to the transfer line 38.

Control of the motors and pumps is determined by a microprocessor 61. In addition, the output of a level sensor 62 provided in the pre-tank 10 is connected to  
15 that processor.

An overflow weir 64 is provided at a higher level in the pre-tank 10. This discharges wastewater via a discharge line 66 and a screen 68 to a river or stream  
70.

20 Under normal conditions of flow, for example in dry weather conditions, wastewater is fed by the feed line 18 to the pre-tanks 10 and 12 via the inlets 14 and 16. The wastewater in those pre-tanks is continually moved around by the stirrer 50 and 52 and the aerators 46 and 48.

25 Under a pre-selective regime, the microprocessor 61 causes the appropriate pump to operate to transfer wastewater from the pre-tanks 10 and 12 to the reactor tank 40.

-6-

In the event that the pre-tanks require servicing and cleaning, one of them is isolated by shutting off its inlet and outlet shut-off valve, whilst the other continues to operate. Normally, however, both shut-off  
5 valves 42 and 44 are open so that the wastewater is balanced equally between the two pre-tanks 10 and 12.

During storm conditions, wastewater rises in the pre-tanks 10 and 12 at a rate faster than the transfer of wastewater to the reactor tank 40. Once the level  
10 exceeds that determined by the sensor 62, the signal to the microprocessor 61 causes the stirrers 50 and 52 and the aerators 46 and 48 to be stopped so that they no longer stir up solids in the tanks. As a result, as the water level in the pre-tanks rises, sludge and solids  
15 more easily settle in these tanks. Sludge is removed from the pre-tanks under the normal treatment regime via the transfer line 38 to the reactor 40. The cover plates 32 and 34 reduce the turbulence caused when sludge is drawn off from the pre-tanks 10 and 12 to the reactor  
20 tank 40, reducing the extent to which the sludge and solids which remain in the pre-tanks during storm conditions are disturbed.

In the event that the storm conditions persist, ultimately water flows out of the pre-tank 10 into the  
25 river 70 via the line 66 and the screen 68. The latter prevents undesirable solids entering into the river or stream. At the same time, shut-off valves 42 and 44 remain open so that the levels in the pre-tanks 10 and 12

-7-

remain substantially equal.

Once the storm conditions have subsided, some of the biomass in the reactor tank 40 may be fed back to the reactor tanks 10 and 12 to assist the apparatus in  
5 dealing with the increased load from the storm. However, it will be appreciated that as a result of the construction of the illustrated apparatus, no additional storm tanks are required, and no cleaning or scraping of any such storm tanks is required.

10 Many modifications and variations to the illustrated apparatus may occur to the reader without taking it outside the scope of the present invention. To give one example only, each pre-tank 10 and 12 could be provided with its respective overflow weir 64.

11

